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**GLOBAL CHANGE IN AFRICAN FISH TRADE:
ENGINE OF DEVELOPMENT OR THREAT TO LOCAL FOOD SECURITY?**

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GLOBAL CHANGE IN AFRICAN FISH TRADE: ENGINE OF DEVELOPMENT OR THREAT TO LOCAL FOOD SECURITY?

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ABSTRACT²

Today fish is the most traded food commodity in the World. This situation is not without generating potential issues. On the one hand, fish trade is said to support economic growth processes in developing countries by providing an important source of cash revenue. On the other hand, fish trade is also said to lead to a decline in food security and a decrease in the availability of fish for the local population. In this paper we explore more thoroughly those two opposite views in the specific case of sub-Saharan Africa. For this we consider a range of eight national development indicators that encapsulate both economic and well-being of sub-Saharan countries over the last decade and correlate them against four indicators reflecting the country-specific importance of fish trade, industrial and small-scale fisheries in the economy of Sub-Saharan Africa. Our statistical analysis shows that when sub-Saharan countries' data are considered at the macro-economic level the fear that fish trade may affect negatively fish food security is not substantiated by any statistical evidences. At the same time the analysis also shows no evidence to support the claim that international fish trade contributes effectively to national economic development and/or wellbeing. The last section of the paper discusses the various possible reasons for this apparent lack of correlation and highlights the respective flaws underlying the two opposite discourse about the role of fish trade in national development and food security.

¹ The assistance of Rebecca Lawton during the initial data compilation and analysis of this research is gratefully acknowledged. The interpretations and conclusions however remain the responsibility of the author only, along with any error or shortcoming, and do not necessarily reflect the official view of the OECD or its members.

² This is a paper presented at the IIFET Workshop in Nha Trang Vietnam, 22-25 July 2008 at the session on *Fisheries and Globalisation: Meeting the Policy Challenges* which was moderated by Anthony Cox, Senior Analyst, OECD Fisheries Policies Division of the Trade and Agriculture Directorate.

INTERNATIONALISATION ET COMMERCE DU POISSON AFRICAIN : MOTEUR DE DÉVELOPPEMENT OU MENACE POUR LA SÉCURITÉ ALIMENTAIRE LOCALE ?

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RÉSUMÉ⁴

Le poisson arrive aujourd'hui en tête dans les échanges mondiaux de produits alimentaires. Cette situation peut être appréciée de différentes manières. D'une part, le commerce du poisson sous-tendrait le processus de croissance économique dans les pays en développement, grâce aux recettes appréciables ainsi générées. D'autre part, il aurait pour effet d'entamer la sécurité alimentaire et de réduire les quantités de poisson mises à la disposition des populations locales. Il s'agit ici d'étudier de plus près ces deux points de vue opposés dans le cas particulier de l'Afrique subsaharienne. Nous examinons à cette fin huit indicateurs nationaux de développement rendant compte à la fois de la réalité économique et du bien-être des pays de la région durant la décennie écoulée, en les articulant avec quatre indicateurs qui font ressortir, pour chaque pays, l'importance du commerce des produits halieutiques, de la pêche industrielle et de la pêche artisanale dans l'économie de l'Afrique subsaharienne. D'après notre analyse statistique, lorsque les données des pays subsahariens sont envisagées au niveau macroéconomique, la crainte d'un effet négatif sur la sécurité de l'approvisionnement en poisson ne se vérifie pas. L'analyse ne vient pas davantage étayer l'argument selon lequel le commerce international du poisson contribuerait effectivement au développement économique et/ou au bien-être national. La dernière section du document passe en revue les diverses raisons susceptibles d'expliquer cette absence apparente de corrélation et souligne les inconvénients respectifs des deux thèses qui s'affrontent sur le rôle joué par le commerce du poisson dans le développement et la sécurité alimentaire à l'échelle nationale.

³ Rebecca Lawton a prêté un concours précieux à ce travail durant la première phase de collecte et d'analyse des données. L'auteur garde cependant l'entière responsabilité des interprétations et conclusions, qui ne reflètent pas nécessairement le point de vue officiel de l'OCDE ou de ses membres, ainsi que des éventuelles erreurs ou omissions.

⁴ Le document a été présenté à la conférence de l'International Institute for Fisheries Economics and Trade (IIFET) organisée du 22 au 25 juillet 2008 à Nha Trang (Vietnam), dans le cadre de la session sur les enjeux de la pêche et de la mondialisation (*Fisheries and Globalisation: Meeting the Policy Challenges*) animée par Anthony Cox, analyste principal, Division des politiques des pêches, Direction des échanges et de l'agriculture de l'OCDE.

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GLOBAL CHANGE IN AFRICAN FISH TRADE: ENGINE OF DEVELOPMENT OR THREAT TO LOCAL FOOD SECURITY?

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Introduction

1. Today, two opposed views coexist in the fisheries literature about the impacts of fish trade on economic development. In line with the general theory on trade, the first one claims that fisheries development and trade are good for poverty alleviation. Fish export, it is argued, can act as an engine of growth for developing countries endowed with large fish resources (Cunningham 2000; Schmidt 2003; FAO 2007; EU 2006). The main argument advanced by those fish trade proponents is that international fish trade, which has experienced exponential growth in the last three decades, can contribute to economic growth in developing countries by providing an important source of hard cash revenue (Valdimarsson 2003, Ahmed 2003; Bostock *et al.* 2004). For many of those developing countries that are often short of revenues, the foreign exchange generated by this trade can be a critical ‘safety buoy’ for the economy as it can be used to service international debt, pay fast growing import bills and fund the operations of national governments (Thorpe *et al.* 2004; Kurien 2005). Foreign exchange earnings can also be used to import much larger volumes of low cost food to supply the domestic market, thus contributing to national food security (Valdimarsson and James 2001; FAO 2005, 2007). Additionally, fisheries trade can indirectly contribute to economic development through the creation of new jobs, the increase of incomes within the sector and secondary flow on effects such as migrant workers sending money to families and dependents at home (Kurien 2005).

2. In contrast, the ‘anti-fish trade’ group contends that fisheries trade impacts negatively on food security and local economy (Kent 1997; Jansen 1997). According to this view, fisheries trade-oriented policies are harmful for local populations as they lead to decline in local fish supply and livelihoods options for the poor (Abila and Jansen 1997; Abgrall 2003). This discourse further argues that experience shows that fishing agreements usually take advantage of the developing coastal states without providing fair returns (Alder and Sumaila 2004), citing as evidence the apparent minimal economic benefits that developing states have managed to derive so far from these agreements, the low rates of revenue reinvested back into the sector and the low usage of local processing facilities and infrastructure by foreign operations (Abila and Jansen 1997; Kaczynski and Fluharty 2002; Alder and Sumaila 2004). It is also argued that trade-oriented fishery policies leads to losses of local jobs and adversely affects the development of the domestic fishing industry (Janssen 1997; Abila and Jansen 1997; Abgrall 2003; Alder and Sumaila 2004).

3. The question of a potential nexus between fish trade and food security thus emerged as a major issue at different levels of the international communities over the last decade. At the higher level for instance, the Code of Conduct for Responsible Fisheries promoted by the Food and Agriculture Organization appealed to states, development banks and other international organizations to ensure that:

*promotion of international fish trade and export production do not result
in environmental degradation or adversely impact the nutritional rights*

and needs of people for whom fish is critical to their health and well being.

4. In a similar vein, the Kyoto Declaration that followed the “International Conference on the Sustainable Contribution of Fish to Food Security” in 1995 also made a direct reference to the problem. The Declaration encouraged states to:

ensure that trade in fish and fishery products promotes food security, (...) does not undermine applicable global, regional and sub-regional conservation and management measures and is conducted in accordance with the principles, rights and obligations established in the WTO Agreement.

5. While this paper will draw partially upon and discuss some of the main conclusions highlighted by these various consultations, our objective is to narrow down the debate to the specific case of fish trade in sub-Sahara Africa. The justification for the focus on this particular region is two-fold. First, although the fishing sector in this part of the world is not as important as it is in some other parts of the world such as South and South East Asia¹, the degree of general destitution and poverty that characterize Africa and in particular its sub-Sahara part is recognized to be one of the highest in the world. Today more than one third (34%) of the sub-Saharan African population is still undernourished (FAO 2003) and almost half of its population (49%) live in absolute poverty (*i.e.* with less than one dollar a day). By 2015, 53% of the world poor population will be living in Africa (UNDP 2005). If fisheries and fish trade are said to contribute to poverty alleviation and food security, the question of whether this is effectively happening in Africa is then worth investigating.

6. The second reason to focus on sub-Sahara Africa is that –as will be revealed in the literature review below- most of the examples used both by the supporters and the critics of the fish trade discourse are derived from the African continent: Senegal, Uganda, Namibia, Mauritania, Kenya, etc. All those African countries are amongst the most frequent case-studies quoted by both pro and opponents to fish trade. However it is difficult to conceive how a same country can offer evidence to both positions at the same time. So which one amongst those two opposed views is correct, and which one is wrong? Or, can they both be right (or wrong) at the same time?

7. To address this question the rest of this paper is articulated as follows. After a short description of the methodology and data used in this research, the main theoretical and empirical arguments advanced by the proponents of the fish trade discourse are presented, followed by a similar analysis of the anti-fish trade arguments. We then turn most specifically to the Sub-Sahara situation. First the main characteristics of the sub-Sahara fish trade is analyzed at the global level through a comparison with the trends of the world fish trade. This comparison will reveal some contrasting results between the generally-positive trends that characterize fish trade at the world/aggregate level and the more unsettling reality that emerges from the African fish trade analysis. In an effort to shed more light on this issue, we will then look at the fisheries and development data for all countries of the sub-Saharan region. Using FAO fisheries trade statistics and UNDP and/or World Bank socio-economic development indicators a series of statistical tests will be run to determine whether the country data provide support to, either the pro-, or the anti-, fish trade positions. The rest of the section will show that while none of the tests tend to confirm the existence of a nexus between fish trade and food security, the data also fail to indicate any clear relationship between fish trade and economic and/or human development. Those different results and their implications in terms of policy are then discussed in the final section of the paper.

Data

8. In contrast with the agricultural sector where other sets of data exist, the FAO fisheries statistics system (FISHSTAT) is so far the only international database that provides a relatively complete coverage, both geographically and across time, of fisheries data around the world. We therefore use this data set as our main source of information on fish trade. For most of our analyses, the following data were considered: total production (landing) and fish trade (import and export) recorded in values (US\$) and quantity (tonnes) over the period 1990-2001. For each country, the fish ‘supply’ was defined as the total landing recorded *plus* the total import *minus* the total export. When normalized to reflect per capita ratio, these fisheries data were adjusted using the total population of the country as recorded in the closest year for which the population data was available. Forty-seven sub-Sahara countries were included in the analyses. The grouping into the four sub-regions is shown in Table 1.

Table 1. List of the 47 Sub-Sahara Countries included in the Analysis, grouped by sub-region

West Africa	Central Africa	Southern Africa	East Africa
Benin	Cameroon	Angola	Burundi
Burkina Faso	Central African Rep	Botswana	Comoros
Cape Verde	Chad	Lesotho	Djibouti
Cote d'Ivoire	Dem Rep of Congo	Malawi	Eritrea
Gambia	Rep of Congo	Mozambique	Ethiopia
Ghana	Equatorial Guinea	Namibia	Kenya
Guinea	Gabon	South Africa	Madagascar
Guinea-Bissau	Sao Tome and Principe	Swaziland	Mauritius
Liberia		Zambia	Rwanda
Mali		Zimbabwe	Seychelles
Mauritania			Somalia
Niger			Tanzania
Nigeria			Uganda
Senegal			
Sierra Leone			
Togo			

9. The economic and development index data used for these 47 countries were computed from the World Bank database (World Bank 2003) and International Monetary Fund database (IMF 2006). As we were not only interested in testing the potential effect of fish trade on macro-economic indexes, but also on poverty reduction (understood in a large multi-dimensional sense), the following eight development indicators were considered: Mortality rate; Malnutrition prevalence; Literacy rate; Mean monthly income; Poverty headcount ratio; Poverty gap; Total debt service; and per capita Gross Domestic Product.

10. Each of those indicators was then correlated against four indicators of fish trade, using statistical tests. The objective was to determine whether the degree of fish trade ‘openness’ of the countries has, or has not, any demonstrable impact on the human and/or economic development indicators in the countries considered.

Fish trade, food security and poverty alleviation

11. Since the 1980s and the seminal work of Sen (1981) the concept of food security has experienced a fundamental shift in its perspective –from a ‘self-sufficiency’ to a ‘self-reliance’ conception (Stevens *et al.* 2003), offering at the same time a firmer foundation and a new legitimacy to the international trade theory (Kurien 2003). Through his entitlement framework Sen demonstrated that in terms of food security, the *production of* food (self-sufficiency) was perhaps not as important as the conditions that ensure the *access to* these food commodities (self-reliance), and that, along with *direct* production, food security could be ensured ‘*indirectly*’ through trade, labour, and transfers (Sen 1981). This analysis provided an

explicit link to the classical trade theory where emphasis is put on exchange (import/export) to ensure the adequate supply of needed commodities. Sen's trade-based entitlement categories correspond in effect to commercial food imports at the national level, and food purchase/exchange at the household level. Thus, using this approach, it is entirely possible and economically rational for a country –or an individual farmer– to achieve food security by growing high-value crops instead of staple grains, and importing/purchasing some proportion of the food it requires with the revenues generated from export/farm surplus crop sales.

12. Applying this principle to fish trade, an increasing numbers of experts and development agencies argue that developing countries well-endowed with coastal and/or inland fish resources should resolutely favour export-oriented strategies in order to seize the comparative advantage offered by those existing resources, with the implicit understanding that the revenues generated through these exports would then be 're-injected' into the national economy, and would in particular compensate for the direct lost of source of animal protein induced by the fish export in the first place (Schmidt 2003; Valdimarsson 2003; Bostock *et al.* 2004).

13. The evidences and arguments that underpin this pro-poor fish trade perception are numerous and impressive. FAO in its most recent State of Fisheries and Aquaculture Report observe that the total world trade in fish and fishery products reached a record value of USD 71.5 billion (export value) in 2004, representing a 23% growth relative to 2000. In real terms (adjusted for inflation), exports of fish and fishery products increased by 17.3% during the period 2000-2004, confirming fish as one of the most highly traded food and feed commodities (FAO 2007). The fishery net exports of developing countries (*i.e.* the total value of their exports less the total value of their imports) have shown a continuing rising trend over the past two decades, growing from USD 4.6 billion in 1984 to USD 16.0 billion in 1994 to USD 20.4 billion in 2004. At the same time, the world aggregate level of fish per capita consumption has risen from 9.0 kg in 1961 to an estimated 16.5 kg in 2003 (FAO 2005).

14. At the country level as well, evidences supporting the pro-fish trade position seem undisputable. In Uganda for instance, export earnings have increased from USD 1.4 million in 1990 to about USD 90 million in 2002 (Bostock *et al.* 2004). In fact, for the three countries involved in the Lake Volta fisheries (Uganda, Kenya and Tanzania) the total revenue generated by the export of Nile perch to Europe has been recently estimated to exceed USD 250 million per year (Geheb *et al.* 2008). In Bangladesh, fish trade accounts for 76% of the total agricultural export value -although this is mainly from shrimp aquaculture- 58% in Morocco and 62% in Peru (Thorpe *et al.* 2005). In Mauritania the fisheries sector generates 27% of the total state budget (Alder and Sumaila 2004).

15. Based on these figures, the legitimacy of continuing to emphasize revenues from fish export, as a national objective, seems hard to question. But one would certainly have also noticed that all these figures are about revenues or foreign exchange earnings, not about actual economic growth, food security, or poverty alleviation. To recognize the link between foreign exchange earnings and poverty alleviation and/or food national self reliance, one must therefore make an additional (strong) assumption, that is, that there exists some redistribution mechanism, some form of 'trickle down' effect, that ensures that -at least part of- the enormous profits generated through fish trade do effectively reach the local population.

16. This point is one the core-arguments brought forward by the anti-fish trade group to question the legitimacy of promoting fish export-oriented policies as a pro-poor strategy. In the case of the Lake Victoria fishery for instance, where the debate about the fish-trade food-security nexus has been particularly heated (see *e.g.* Geheb *et al.* 2008), many local researchers and activists argue that very little of the massive foreign exchange and tax revenues earned from the exports is ploughed back to finance infrastructural and human development of the fishing communities. The African Center for Technology Studies (Mugabe *et al.* 2000) for instance, quote a Kenyan government official report that showed that the town of Kisumu in Kenya, where 80% of the Nile perch factories are located, had the highest percentage of

population suffering from food deficiency and absolute poverty, among all urban areas in the country. In Namibia where the fishery sector is reported to generate a substantial share of the total government revenues, Lange *et al.* (2003) show that the country only recovered a small portion of the resource rent from fisheries and has failed so far to reinvest that rent into social or economic development.

17. Those who show scepticism about fish trade do not simply question the pro-poor dimension of this fish-trade. They actually claim that export-oriented fish policy may in some cases work against the poor. Based on their own research, Abila and Jansen (1997) estimate that about 15 000 jobs in the traditional fish processing and marketing sector around the Lake Victoria have been lost as a result of the development of the trade industry. Jansen also refers to what he terms the 'reverse proprietorship' claiming that 83% of fishers working in boats no longer own either the vessel or any fishing gear (Abila 2003).

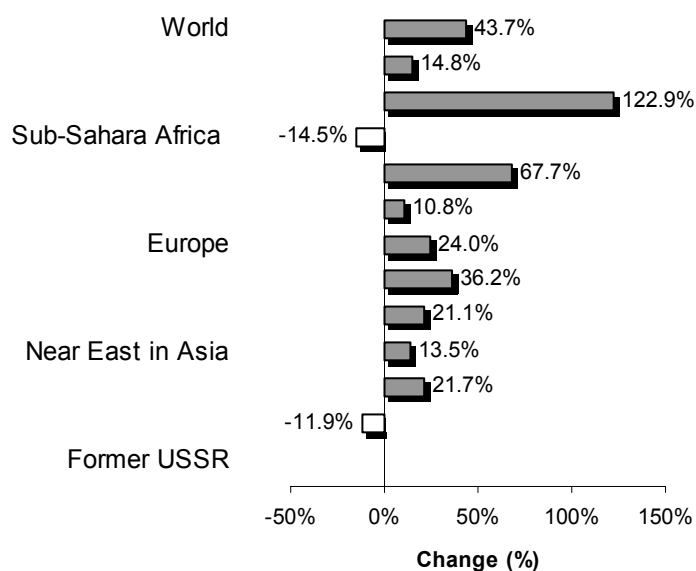
18. In fact the line of argument goes beyond the potential negative impact of export on the livelihoods (employment, and direct food security) of the local population. In the case of the fishing agreement between African countries and the Europe Union countries (EU), Kaczynski and Fluharty (2002) argue that those fisheries agreements have taken advantage of West African coastal states – EU gaining much and exploiting marine resources of West Africa with little regard for development or sustainability. To make their point, these authors take the example of Guinea-Bissau. They calculated that in that country, EU fisheries license revenues make it up to only 10.5% of the estimated actual value of the coastal resources exploited by EU vessels and less than 0.5% in the case of the offshore tuna fisheries (Kaczynski 1998).

19. In brief, the controversy about fish trade is still very much unsettled. Paradoxically, both proponents and critics have been relying on, and quoting, extensively African fisheries examples (sometimes from the same countries) to try to make their cases. The supporters of the fish trade, however, also tend to rely heavily on global/world level statistics. For both country and world statistics, however, these pro-fish trade figures are essentially the compilations of foreign exchange earnings and/or revenues derived from fish trade, rather than evidences of real effects of these revenues on the national economy of the countries or the livelihoods of the populations. To be able to demonstrate effectively the pro-poor dimension of the fish trade, they would still need to prove the realness of the trickle down effect. At the other end of the spectrum, the fish trade skeptics have not really managed to win the consent of the rest of the scientific and donor communities, as they have been essentially relying on a few local studies, thus failing to provide any strong 'generalisation dimension' to their arguments.

Fish trade in Africa: A Global and Regional Comparative Assessment

20. One of the most misleading perceptions about fish trade and development is the implicit link that is sometimes made between the substantial growth in world fish export and the increase in fish per capita supply observed at the aggregated level -as if the latter had been the direct consequence of the former. While this false correlation may look 'true' at the world aggregate level, the analysis at the continent level reveals a very different pattern, in particular for sub-Saharan Africa. In this part of the world fish supply per capita has declined by 14% over the last 12 years (Figure 1) reaching a world-low record of 6.7 kg/year in 2006. In fact, sub-Saharan Africa is the only part of the World where fish supply per person is declining while production is still increasing.

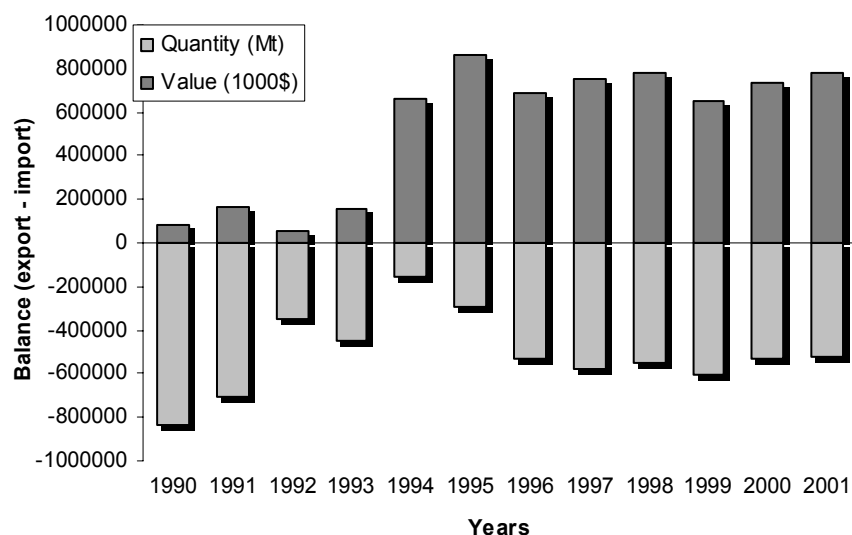
Figure 1. Change in Fish per capita Supply in Different Regions of the World for 1990-2002



Source: FAO (2005).

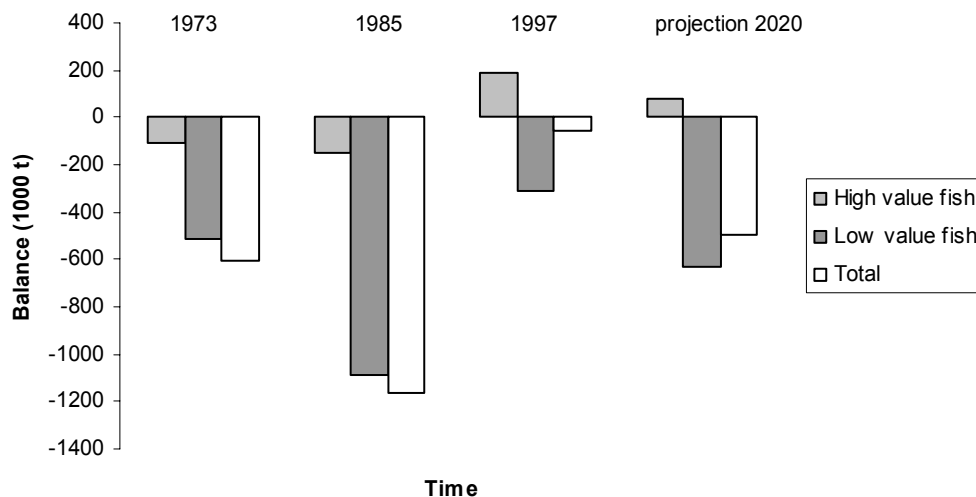
21. When fisheries trade and production are compared at country level, it is apparent that regional trades are being driven only by a small number of countries. Only 6 countries export more than 250 000 t per year: Tanzania, Ghana, Nigeria, Senegal, Namibia and South-Africa. Interestingly none of those countries (nor any of the other majors fishing nations such as Uganda or Kenya) has a positive fish trade balance (export – import) when considered in quantity. In fact, a more thorough analysis reveals a fundamental structural unbalance in fish trade in sub-Saharan Africa. While the trade balance measured in value terms has increased from almost zero in 1990 to USD 750 million in 2001, the same balance has remained desperately negative in quantity (Figure 2). The huge revenues generated through fish trade in the sub-Saharan countries do not seem to be successful in reducing the gap between fish demand and supply in these countries.

Figure 2. Fish Trade Balance of Sub-Sahara Africa between 1990 and 2001 measures in both Value and Quantity



Source: FAO (2005).

Figure 3. Evolution of Sub-Sahara Fish Trade Balance for Low Value, High Value and Total Fish Trade between 1973 and 2020 (projection)



Source: Delgado *et al.*, (2004).

22. Perhaps even more concerning is the situation when the distinction is made between high value and low value fish. Using the data for 1973, 1985, 1997 and a projection for 2020, Delgado *et al.* (2003) have shown that this gap is expected to widen further in the future, with the high value fish trade remaining

just above zero (import equaling export) while the projection for the low value fish trade plunging drastically to a level close to half a century earlier, in 1973 (Figure 3). If we accept the reasonable simplification that high value fish are essentially satisfying the demand of the rich, urbanized consumers (in developed and developing countries) while low value fish are essentially the fish supply of the poor, we realized that in opposition to what the proponents of the fish trade claim, fish export does not seem to improve the food security of the poorest in Africa, at least in term of access to fish. Not surprisingly the fish per capita supply in Africa is expected to fall further to 6.6 kg / per capita / year in 2020.

Impact of fish trade on development

23. In this section we propose to revisit more rigorously some of the points claimed and/or disputed by the proponents and the critics of fish trade. In particular, we aim at testing whether fish trade is effectively an engine of growth and a support for poverty alleviation (as claimed by the pro-fish trade group) or whether it impacts, in contrary, negatively on the countries that have decided to embrace export-oriented strategies (as claimed by the anti-fish trade activists). For this we used the FAO fisheries trade statistics and UNDP and/or World Bank socio-economic development indicators to run a series of statistical tests.

24. Each of the development indicators were tested against four fish trade ‘proxies’ computed for each country. First the percentage of production exported (i.e. ratio of fish export over total fish production in quantity) was used as a proxy of the country’s export ‘openness’. Irrespective of its absolute quantity, a country that exports, say, 80% of its total production was considered more ‘open’ to fish-export policies than a country that exports only 30% of its national production. The second indicator we used was the per capita export value, as a proxy for the relative importance of the export revenue adjusted by the total population of the country. Clearly, the same export revenue, say USD 20 million per year, generated through fish export is expected to have a bigger impact on the economy of a 1.5 million people country than on a 150 million people country. The third fish-trade proxy was the existence (presence/absence) of fishery agreements between African countries and EU countries. The sub-Sahara countries were therefore divided into two groups (those with fishing agreement (FA) and those with no FA), with the objective to test whether the existence of these FA has had impact on any of the eight different economic and human development indicators considered here. The fourth and final fishery indicator was the total fish production per capita. This indicator was proposed as a proxy, not for fish trade activities *per se*, but for the relative importance of fisheries in the national economy of the country considered. A high fish production per capita figure indicates a country for which small-scale fisheries are proportionally important, irrespective of whether or not the sector exports a large part of this production.

25. The eight economic and human development indicators were tested against these 4 proxies. As both the FAO fish data and the economic and/or human indicators were not necessarily available for the whole set of 47 sub-Sahara countries, the tests were run with all countries for which the combination indicators - proxies could be computed. For the three quantitative proxies (fish exported over total fish production; per capita export value; and fish production per capita) the statistical analysis consisted in testing the significance of the correlation coefficient between these proxies (explanatory variable) and the economic or development indicators (dependent variables), using linear regression models. For the qualitative proxy (existence of FA), the test was performed through ANOVA or Kruskal Wallis tests, depending on the degree of normality of the data.

26. Results are summarized in a series of tables. Table 2 shows the result of the regression tests between the percentage of production exported (proxy 1) and the 8 development indicators. Table 3 shows the same results but for regression models run with the per capita export value (proxy 2). Table 4 displays the results of the eight ANOVA or Kruskal Wallis tests run between the FA and non-FA countries, and

Table 5 shows the results of the regressions between the production per capita and the development indicators (proxy 4).

27. Tables 2, 3 and 5 show no statistically significant correlations at $\alpha = 5\%$ between the fish trade *proxies* and the eight development indicators -except for debt service regressed against the per capita production. Similarly, using the ANOVA and Kruskal Wallis tests (Table 4), no statistical differences were found between the countries with and without European fisheries agreements, except for the mortality rate.

28. In other words, despite a wide range of models tested, no demonstrable correlation was found in sub-Saharan Africa between fish trade and national economic development and/or wellbeing indicators. One important point to highlight is that these results, by failing to demonstrate any impact, either positive or negative, do not simply question the pro fish trade narrative. It also refutes the fish trade – food security nexus, at least at the national level.

Table 2. Percentage of fisheries production exported (proxy 1)

Development Indicator	N	a	R ²	P value
Mortality rate ^(a)	22	-2.18	0.03	0.47
Malnutrition prevalence ^(b)	15	-0.84	0.08	0.31
Literacy rate ^(c)	17	2.04	0.04	0.42
Mean monthly income ^(d)	18	4.85	0.07	0.29
Poverty Headcount ratio ^(e)	18	-0.25	<0.001	0.92
Poverty Gap ^(f)	18	0.25	<0.01	0.86
Total debt service ^(g)	19	-0.001	<0.01	0.88
Per capita GDP ^(h)	22	0.08	0.05	0.30

Table 3. Per capita fisheries export value (proxy 2)

Development Indicator	N	a	R ²	P value
Mortality rate ^(a)	41	-1.55	0.02	0.37
Malnutrition prevalence ^(b)	20	-0.63	0.04	0.39
Literacy rate ^(c)	29	1.37	0.04	0.29
Mean monthly income ^(d)	27	6.52	0.13	0.07
Poverty Headcount ratio ^(e)	27	-0.88	0.01	0.53
Poverty Gap ^(f)	27	-0.50	0.01	0.56
Total debt service ^(g)	31	-0.001	<0.001	0.98
Per capita GDP ^(h)	39	0.06	0.03	0.28

Table 4. N test P value

Development Indicator	no FA	FA		
Mortality rate ^(a)	37	11	ANOVA	0.02*
Malnutrition prevalence ^(b)	19	4	ANOVA	0.87
Literacy rate ^(c)	27	6	K Wallis	0.18
Mean monthly income ^(d)	25	5	ANOVA	0.15
Poverty Headcount ratio ^(e)	25	5	K Wallis	0.13
Poverty Gap ^(f)	25	5	ANOVA	0.19
Total debt service ^(g)	24	11	K Wallis	0.34
Per capita GDP ^(h)	36	11	K Wallis	0.26

Table 5. Per capita fisheries production (proxy 4)

Development Indicator	N	a	R ²	P value
Mortality rate ^(a)	45	-3.99	0.04	0.17
Malnutrition prevalence ^(b)	23	-1.88	0.14	0.08
Literacy rate ^(c)	30	-2.74	0.05	0.22
Mean monthly income ^(d)	29	0.68	<0.001	0.88
Poverty Headcount ratio ^(e)	29	-0.46	0.002	0.83
Poverty Gap ^(f)	29	0.01	<0.001	0.99
Total debt service ^(g)	33	0.16	0.14	0.02*
Per capita GDP ^(h)	43	0.04	<0.01	0.62

Note: In all models, the explanatory variables are log-transformed. Per capita GDP and total debt service data are log-transformed. The sign * denotes a significant correlation at $\alpha = 5\%$.

(a): mortality rate Infant per 1000 (2005 data). Data source: World Bank (2007), downloaded July 2007.

(b): malnutrition prevalence (weight for age, percentage of children under 5 - average 2001-2005).

Data source: World Bank (2007).

(c): literacy rate, adult total (% of people ages 15 and above). Data source: World Bank (2007).

(d): average monthly per capita income/consumption expenditure. Source: World Bank (2007).

(e): % of population living in households with consumption or income per person below the poverty line. Data source: World Bank (2007), downloaded July 2007, using standard default setting of \$32.74 per month as the poverty line.

(f): mean distance below the poverty line as a proportion of the poverty line. Data downloaded July 2007, using standard default setting of USD 32.74 per month as the poverty line.

(g): total debt service (% of exports of goods, services and income -average 2001-2005. Source: World Bank (2007)

(h): per capita GDP USD (1990-2005 average) Data source: IMF (2006), downloaded September 2006.

Questioning the trickle-down effect

29. The absence of correlation between the fish trade indicators and the development/welfare indicators could have two explanations. Either there is effectively no relationship between fish trade contribution and development, irrespective of how this contribution is measured (e.g. what type of fisheries

proxies we used) or what we think development is about (e.g. which development indicators we used). Or, a relation exists but our analysis did not detect it.

30. No doubt that fish trade advocates would tend to agree with our second interpretation. If it is indeed the case that a relation exists but the data we used failed to identify it, it is then their task to provide the empirical evidences that fish trade effectively contributes to economic growth and/or poverty alleviation in sub-Sahara Africa. In the meantime, and whether or not one espouses their view, it may still be worth exploring the second potential reasons why no demonstrable correlation was found in the case of sub-Sahara Africa.

31. One explanation could be that the contribution of fishery exports is (too) small relative to the rest of the national economy. Country level data suggest that this could indeed be the case at least in a certain number of sub-Sahara countries where the volumes of both production and exports appear to be relatively low. Considering the contribution of fisheries to GDP also provides support to this argument. For the sub-Sahara countries for which the information is available, the average figure is usually less than 2%. Even in Namibia and Ghana - the two African countries with the highest contribution- the fisheries share to GDP is less than 8% (Béné 2006). In those conditions, even if the redistribution of fish export revenues was to be effective, the amount redistributed may still not be large enough to have a significant impact on national indicators: what is going on in the other 98% of the economy masks any 'fisheries effect'.

32. For some other, better endowed countries, fisheries may generate an amount of revenues significant enough to have potentially an effect on the rest of the economy. For instance in Senegal, fish export represents 60.4% of the total agriculture exports, or in Ghana 8% of the GDP. Nevertheless, for poverty alleviation to occur, or even for economic growth to take place, wealth created from any sector must 'trickle down' through some form of redistribution mechanisms (Reddy and Pogge, 2003; Wade 2004; Basu 2006). This principle is also true for small-scale fisheries (Béné *et al.* 2004). The absence of correlation between fish trade and development indicators was observed in our case even for the largest African exporters.

33. This issue of lack of trickle down effect had already been highlighted in several (other) parts of the world. Based on a review of 11 case studies from the developing world², Kurien (2003) carried out recently an in-depth analysis of the contributions of fish trade to food security. In his carefully worded analysis, he acknowledges the central role of the trickle down hypothesis. He found that, overall, there was little evidence of significant real improvement in the general well-being of local households (both producers and consumers) that could be directly associated with harvesting or producing high priced fishery products for export (p.45). He illustrates his point with the case of Chile, one of the world's largest fish exporters, where entire regions have been devoted to export-oriented aquaculture. The Lakes Region, in particular, is the region of Chile with the highest concentration of export-oriented salmon farming. Kurien observes that this region is also the region with the lowest average per capita income in Chile. He concluded:

"The evidence from most of our case studies belies the proposition that merely enhancing the national economic pie through international fish trade will benefit the poorest sections of society through their increased labour participation (p.76). Clearly, the 'trickle down' theory has little credibility. The shark's share of the benefits from international fish trade accrues somewhere between the rich-country consumer and the poor-country producer." (p.46)

34. Although our analysis does not offer any answer to Kurien's question on where this shark's share falls exactly, it certainly supports his conclusion. Indeed, even in the group of sub-Sahara countries that

derive substantial revenues from fish export, the absence of correlation between these fish trade revenues and the development indicators seriously challenge the hypothesis of a trickle down effect, and suggests instead that trade revenues are ‘dissipated’ before they have the chance to impact on any economic and/or human development indexes. For the rest of the sub-Saharan countries (i.e. the majority) that derive modest revenues from fish export, those revenues are not even large enough (irrespective of whether effective trickle down mechanisms exist or not) to impact their macro-economy. In brief, in either case (substantial revenues or more modest ones), no quantifiable effects are identifiable in sub-Saharan Africa, explaining the lack of statistical correlation observed in our analysis.

Conclusion

35. Because it is today one of the most traded food commodities, fish holds a particular position in the current debate about market globalization and the role that international trade can play on economic development and poverty alleviation.

36. Historically the trends in fish trade seem to have been rather beneficial to the developing world as a whole and, from a global perspective, the continued significance of international trade in fishery products is undeniable. Relying on those figures, a pro fish trade narrative has emerged in the course of the 1990s, and an increasing number of national and international institutions are now promoting fish trade as a poverty alleviation tool for developing countries. A more in-depth analysis of the data reveals however that Sub-Saharan Africa stands out as a major exception in this rosy picture and suggests that it would be misleading to rely on global world’s figures to infer any conclusion at regional level. In particular while the developing countries as a whole are projected to continue to be net fish exporters in the future, recent simulations have shown that sub-Saharan Africa current trade deficit (in quantity) is expected to deepen further and reach substantial negative figures by 2020 (Delgado *et al.* 2003). In this context, a number of NGOs and academics have voiced concerns about the current strategy that consists in promoting export of high value fish to developed countries’ markets. They claim that this export-oriented approach is not generating the benefits that the theory predicts and may, in contrary, be detrimental to the food security and livelihoods of the local population as it is seen to remove fish from African markets and consumers’ table.

37. Our analysis shows that when sub-Saharan countries’ data are considered at the macro-economic level (national statistics) those fears are not substantiated by statistical evidences. The same data, however, also challenges the pro-fish trade narrative as our analysis reveals that no demonstrable relationship exists between fish trade and macro-level indicators of economic growth or poverty alleviation. We argue that this lack of relationship is due to the poor, or even the absence of, efficient trickle down mechanisms which fail to redistribute the revenues generated by fish exports to the poorest segments of the population.

NOTES

¹ Sub-Sahara Africa accounts for about 7% of the total fish landing in the world (excluding China) –while South and South East Asia account for 9% and 20% respectively (FAO 2002).

² Kenya, Ghana, Namibia, Sri Lanka, Thailand, and the Philippines, Nicaragua, Brazil, Chile, Senegal, and Fiji. Note that some of those case-studies also included fish farming (aquaculture) and not simply fisheries.

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